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Section 7 - Detection Equipment

Overview

This section is structured to show detection equipment and recommended technologies based on both the type of expected hazard (Chemical, Biological, Radiological, Thermal, Explosive[1]) and the anticipated mode of use (Portable, Transportable Lab Equipment, Fixed Site, and Standoff). The equipment list continues to annotate the capabilities of each detection device using three codes: D for Detect, I for Identify, and Q for Quantify.

The maturity and types of detection technology vary greatly depending on the level and type of hazard the user is detecting, and therefore the number and sophistication of the detection devices also varies greatly. Radiological detection devices have been commercially available and widely used for decades. Though the military has been using them since World War I, chemical detection devices (especially for traditional chemical warfare agents) have only recently been available to the civilian community. There are numerous types of chemical detection technologies, each of which has different characteristics and operating parameters. Biological warfare agent detection devices have only recently become commercially available, and new technologies continue to emerge.

The D&D Subgroup is working to incorporate applicable testing standards and certifications as they become available, written, and approved for all types of detection devices. The Subgroup has also made great strides in aligning this SEL section with the DHS Authorized Equipment List. This year's edition includes new items using Pulsed Neutron Activation and Reactive Polymer technologies, and consolidates explosive detection equipment (and canines) into a single section. Finally, the Subgroup is working with the IAB's new Training Subgroup to align the levels of proficiency used in this section with training standards and requirements.

Sub-Section Headings for 2006

This section structure is organized around likely modes of use. The major groupings are Chemical Detection and Support, Biological Detection and Support, Explosive Detection, Radiological Detection and Support, and Support Equipment. Within these categories, the subcategories used are:

- ***Portable,*** defined as being human portable for mobile operations in the field. The instrument is light enough to be carried or worn by an emergency responder and operated by one individual.
- ***Transportable Lab Equipment,*** defined as being human portable for mobile operations in the field but generally requires a trained technical operator as well as extensive labor.
- ***Fixed-Site Sampling or Detection Systems,*** defined as stand-alone detection systems specifically designed to operate inside a building, fixed-mounted to a vehicle, or set up in a fixed location to monitor an incident perimeter.
- ***Standoff Detector Systems,*** defined as equipment specifically designed to monitor the presence of chemical/biological agents that may be present in the atmosphere up to three miles away. These systems typically require one or two individuals for monitoring operations. Depending on the technique employed and the environmental conditions, these detectors can have high or low selectivity. Standoff detectors usually require vehicle transport and special setup.

This section of the SEL has a unique feature within the Operating Considerations field to assist users in determining anticipated costs and training time required for each type of equipment. Rating scales were adopted by the Detection and Decontamination SubGroup to quantify initial equipment costs,

[1] *This scheme is a slight modification to the standard CBRNE, which treats the N (Nuclear) as part Radiological, part Thermal, and part Explosive.*

recurring operation and maintenance (O&M) costs, and amount of training required to become and remain proficient in the operation of the equipment. The initial cost was based on the estimated average cost of equipment that fit the category, including all necessary (but not extra) components. The O&M costs and training hours were based on estimated average annual requirements. The following scales were set:

Cost Scale (used for initial cost and yearly maintenance costs)

<$1K	$
$1-10K	$$
$10-50K	$$$
$50-100K	$$$$
>$100K	$$$$$

Training Scale (yearly requirement including initial training)

< 1 day	Minimal
1-2 days	Moderate
> 2 days (or requiring knowledge of chemistry, radiation, explosives or biology, or recurring training more than once a month)	Extensive

Online Selection Factors

Like most sections in the 2006 SEL, the online version[2] of the Detection Section uses a pair of selection factors to assist users in quickly identifying appropriate equipment items. For the Detection Section, the SubGroup chose to use Proficiency Level and Hazard Environment (described below) as the two factors. Every online item is "tagged" for each appropriate combination of factors. Thus users on the online version can choose any combination of Proficiency Level and Hazard Environment, and the system will provide a list of all items tagged for that combination.

Proficiency Level is the first factor. In addition to any specific training required to operate an individual piece of equipment, the equipment operator must possess the skills necessary to meet the recommended proficiency level. The considerations in determining this level include the anticipated location of operation (i.e. hot zone, warm zone, or cold zone), the complexity of the equipment, and the necessity for chemical or biological training or expertise. Proficiency Levels have been defined in accordance with NFPA 472, Standard for Professional Competence of Responders to Hazardous Materials Incidents, as follows:

- **Awareness Level.** First responders at the awareness level are those persons who, in the course of their normal duties, can be the first on the scene of an emergency involving hazardous materials. First responders at the awareness level are expected to recognize the presence of hazardous materials, protect themselves, call for trained personnel, and secure the area.
- **Operational Level.** First responders at the operational level are those persons who respond to releases or potential releases of hazardous materials as part of the initial response to the incident for the purpose of protecting nearby persons, the environment, or property from the effects of the release. They should be trained to respond in a defensive fashion to control the release from a safe distance and keep it from spreading.
- **Technician Level[3].** Hazardous materials technicians are those persons who respond to releases or potential releases of hazardous materials for the purpose of controlling the release. Hazardous materials technicians are expected to use specialized chemical protective clothing and specialized control equipment.

[2] *The online version of the SEL is available on the Responder Knowledge Base at www.rkb.mipt.org.*

- **Command Level.** The incident commander is that person who is responsible for all decisions relating to the management of the incident. The incident commander is in charge of the incident site.

The second selection factor is Hazard Environment, which includes the particular CBRNE hazard environment(s) for which each item is suitable. As stated earlier, for our purposes it is useful to represent the Nuclear "N" as part Thermal, part Explosive, and part Radiological. Therefore, the Hazard Environment values used for online selection are:

- Chemical
- Biological
- Radiological
- Thermal
- Explosive

Finally, the Detection and Decontamination SubGroup strongly recommends that a minimum of two *different* but complementary detection technologies (e.g. infrared, acoustic wave, etc.) be used to validate readings rather than relying upon any single instrument. This procedure will assist responders in interpreting data to better conduct their risk assessment and incident action plan.

[3] *This level was modified slightly by the SubGroup for this publication. The Technician Level was changed to Technician/Specialist (the term "specialist" as used here should not be confused with the Private Sector Specialist definition in NFPA 472). A Specialist, for purposes of our matrix, was defined as an equipment operator that possessed extensive technical expertise, but did not possess emergency response HAZMAT experience or knowledge. Generally, a Specialist would be required for a piece of equipment defined as Transportable Lab Equipment.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
BD - Biological Detection 01 - Portable			
07BD-01-KFAS Kit, Field Assay	Field assay kit. [D,I]	Stand alone or with assay reader ---------- Test results are presumptive: confirmatory process required Limited shelf life Requires temp-controlled storage Strict operating procedures For use with bulk material (visible) point sampling - not for environmental surveys Limited number of agents Time sensitive Initial cost: $ Maintenance: $ Training: minimal Frequent refresher training required	
07BD-01-PTST Kit, Protein Test	Protein test kit. [D]	Handheld ---------- Basic screen for biologicals based on protein detection Test results are presumptive: confirmatory process required Non-discriminatory between live or dead cells, harmless or harmful Reagents have limited shelf life For use with bulk material (visible) Initial cost: $ Maintenance: $ Training: minimal Operational competency maintenance required	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
BD - Biological Detection 02 - Transportable Lab Equipment			
07BD-02-DNRN Analysis, DNA/RNA Detection	DNA/RNA detection analysis (example: PCR). [D,I,Q]	---------- Test results are presumptive: confirmatory process required Reagent quality: continuous refrigeration required, highly perishable Proper sample preparation critical Does not discriminate between living and dead organisms Initial cost: $$$ Maintenance: $$ Training: extensive Skill competency maintenance required	
BS - Biological Support 01 - Portable			
07BS-01-KBBA Kit, Biological Sampling/evidence - Batch	Biological Sampling and Evidence Kit. Collects samples for later analysis.	Sample collector ---------- Initial cost: $ Maintenance cost: $ Training: minimal	
07BS-01-KBPA Sampler, Biological, Portable Air	Portable air sampler for biological sampling/evidence.	Handheld Portable Air particulate/aerosol Collects sample for lab and/or assay analysis ---------- Variable air flow rate Shelf life consideration Filter: medium Initial cost: $$ Maintenance: $ Training: minimal	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
BS - Biological Support 03 - Fixed-Site Sampling and/or Detection Systems			
07BS-03-KBAP Kit, Biological Sampling/evidence - Automated Perimeter Sampling Systems	Biological sampling/ evidence kit - automated perimeter sampling systems.	Building system mounted Vehicle mounted/carried Collects/Concentrates air particulates/aerosols only Deposits sample on filters or collection medium ---------- Does not differentiate particle type Variable air flow rate Filter medium Initial cost: $$$ Maintenance: $ Training: minimal	
CD - Chemical Detection 01 - Portable			
07CD-01-CLAS Strips, Classifier (pH, Waste Water, Chemical)	Waste water classifier strips, pH and Chemical [D]	Easy to use Paper indicator ---------- Initial cost: $ Maintenance: N/A Training: minimal	
07CD-01-DPFI Detector, Flame Ionization (FID), Point, Chemical Agent	Flame Ionization Detector (FID), for point chemical agent detection. [D]	Handheld ---------- Non-specific Presence/absence Combustible fuel source (transportation may be an issue) Cannot be used in explosive atmospheres Initial cost: $$ Maintenance: $ →	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
CD - Chemical Detection 01 - Portable - *Continued*			
		Training: minimal	
07CD-01-DPFP Detector, Flame Photometry, Point, Chemical Agent	Flame photometry detector for point chemical agent detection. [D,I,Q]	Detects nerve and blister --- Prone to false positives (anything containing sulphur and phosphorus) Requires hydrogen fuel (expensive to ship, buy in bulk to reduce cost) Initial cost: $$ Maintenance: $$ Training: minimal	
07CD-01-DPIR Detector, Fourier/ Raman Infrared, Point, Chemical Agent	Fourier/Raman Infrared (IR) detector for point chemical agent detection. Includes Fourier Transform Infrared (FT-IR), Raman, and FT-IR/Raman devices. [D,I,Q]	Detects liquid, vapor and solid samples --- Visible sample size needed for liquid/solid samples Additional expense in purchasing libraries Unstable at low temperatures Spectral interpretation necessary Initial cost: $$$$ Maintenance: $ Training: extensive	
07CD-01-DPMG Detector, Multi-sensor Meter, Point, Chemical	Multi-sensor meter with minimum of O2 and LEL for point chemical detection. [D,I,Q]	4-5 gas meter Each sensor for different operation (O2, LEL/UEL, CI2, CO, H2S, etc) Fan or pump operated --- Requires calibration prior to each use Calibration gases transportation issues Shelf life dependent on type of sensor Moderate sensitivity →	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
CD - Chemical Detection 01 - Portable - *Continued*			
		Initial cost: $$ Maintenance: $ Training: moderate	
07CD-01-DPPI Detector, Photo-Ionization (PID), Point, Chemical Agent	Photo-Ionization Detector (PID) for point chemical agent detection. Volatile Organic Chemical (VOC) [D]	Handheld Fan or pump operated Variable pump speeds Intrinsically safe --- Non-selective Utilizes different lamps to detect the presence of different substances Requires calibration prior to each use Problems at high humidity and low temperatures Calibration gases require special transportation Service life dependent on type of lamp Ionization potential must be considered Initial cost: $$ Maintenance: $ Training: moderate	
07CD-01-DPSI Detector, Spectrometry, Ion Mobility, Point, Chemical Agent	Ion mobility spectrometry detector for point chemical agent detection. [D]	Handheld Battery operated Self-testing --- Optional wireless remote displays and data logging Readout indicates relative concentration, not actual measurement Non-selective Prone to false positives Internal radioactive source requires wipe test and NRC licensing →	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
CD - Chemical Detection 01 - Portable - *Continued*			
		Initial cost: $$ Maintenance: $$ Training: minimal	
07CD-01-DPSW Detector, Surface Acoustic Wave (SAW), Point, Chemical Agent	Surface acoustic wave detector for point chemical agent detection. [D,I,Q]	Handheld Detects chemical warfare agents Battery operated --- Polymers and acoustic wave components subject to degradation over time Optional wireless remote displays and data logging Readout may indicate relative concentration or actual measurement Initial cost: $$ Maintenance: $ Training: minimal	
07CD-01-INPA Paper, Indicating, (M-8)	Indicating paper, Chemical Warfare Agent [D, I]	Handheld Will specify type/class of Chemical Warfare Agent (G, VX, H) Easy to use Response time: 30 seconds --- Liquid agent only Long shelf life Initial cost: $ Maintenance: N/A Training: minimal Prone to false positives	
07CD-01-INTP	Indicating tape, Chemical Warfare Agent [D, I]	Will specify type/class of Chemical Warfare Agent (G, VX, H) Easy to use →	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
CD - Chemical Detection 01 - Portable - *Continued*			
Tape, Indicating (M-9)		Response time: 30 seconds Attached to PPE or equipment --- Liquid agent only Long shelf life Initial cost: $ Maintenance: N/A Training: minimal Prone to false positives	75, 78
07CD-01-KCTC Kit, Colorimetric Tape/Tube/Chip	Colorimetric tape/tube/chip kit specific for TICs and WMD applications. [D,I,Q]	Chemical specific User friendly --- Limited shelf life Wide variance in detection level Sensitive to humidity and temperature Initial cost: $$ Maintenance: $ Training: minimal	
07CD-01-KLSV Kit, Chemical Classifying	Chemical classifying kit for unknown liquids, solids and vapors. [D,I]	Identifies classes of chemicals --- Requires constant refresher training, dedicated technician Time consuming Subjective results Reagent shelf life and replacement costs Initial cost: $$ Maintenance: $ Training: extensive	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
CD - Chemical Detection 01 - Portable - *Continued*			
07CD-01-KPCB Kit, PCB Test	PCB test kit. [D, I, Q]	Regulatory detection level --- Limited shelf life Initial cost: $ Maintenance: $ Training: minimal	
07CD-01-KTHG Kit, Mercury Test/ Mercury Vapor Test	Mercury and mercury vapor test kit. [D]	Easy to use Moderate detection level --- Initial cost: $ Maintenance: $ Training: minimal	
07CD-01-KWTR Kit, Chemical Agent Water Test	Chemical agent water test kit. [D]	Detects chemical agents in water Unspecified detection level --- Initial cost: $ Maintenance: $ Training: minimal	
07CD-01-M256 Kit, M-256(A1)	M-256(A1) Detection Kit for chemical agent (military grade; blister: HD/L; blood: AC/CK; and nerve: GB/VX) detection. [D, I]	Detects nerve, blood and blister agents Self-contained colormetric kit Instructions in case Response time: 15 -25 minutes Training kit available --- Detects presence/absence, not quantity Vapor only, except G agents →	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
CD - Chemical Detection 01 - Portable - *Continued*			
		Must be disposed of as hazardous waste after use Shelf life considerations Initial cost: $ Maintenance: $ Training: minimal	
07CD-01-MONO Detector, Single Chemical Sensors	Single gas meter with point chemical detection [D,I,Q]	One gas meter Different sensor for each operation Fan or pump operated, some passive ---------- Fresh air zeroing at start up Different sensors for different gases Shelf life dependent on sensor type Moderate sensitivity Initial cost: $ Maintenance:$ Training: minimal	
07CD-01-PNAA System, Pulsed Neutron Activation, Non-Invasive	Chemical detector utilizing pulsed neutrons. Non-destructive detection of CWAs in sealed containers. [D,I]	Detection unit combined with computer library of chemical spectrums ---------- Radiological controlled materials requiring swipe tests and NRC license NRC radiological controls program is required prior to purchasing this equipment Initial cost: $$$$ Maintenance: $$$ Training: extensive	
07CD-01-POLY	Reactive polymer point chemical agent detector.	Chemical specific polymers Discrete id and quantification →	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
CD - Chemical Detection 02 - Lab Equipment - *Continued*			
Detector, Reactive Polymer	[D,I,Q]	---------- Emerging technology Requires specific chip for chemical(s) being detected Some polymers degraded with acids Initial cost: $$ Maintenance: $$ Training: minimal	
CD - Chemical Detection 02 - Lab Equipment			
07CD-02-DPGC Detector, Gas Chromatograph/Mass Spectrometer, Chemical Agent	Gas chromatograph and/or mass spectrometer detector for chemical agent detection. (GC and/or MS). [D,I]	Identifies specific chemicals Durable Response time: 5-15 minutes ---------- Climate sensitive High maintenance and recurring training Reagents and calibration requirements costly Initial cost: $$$ Maintenance: $$ Training: extensive	
CD - Chemical Detection 03 - Fixed-Site Sampling and/or Detection Systems			
07CD-03-IRED Detector, Fixed Site, Chemical, Infrared	Chemical detection devices designed to be mounted in buildings or on fixed exterior mounts that utilized →		

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
CD - Chemical Detection 03 - Fixed-Site Sampling and/or Detection Systems - *Continued*			
	infrared detection technologies such as Fourier Transform Infrared (FT-IR), Raman, FT-IR/Raman, or Photoacoustic Infrared (PIR) for chemical detection. [D,I]		
CD - Chemical Detection 04 - Standoff Detectors			
07CD-04-DCSO Detector, Stand-Off, Chemical	Stand-off chemical detector. [D,I] FTIR system	Cold zone operations Detects to 5 km --- Currently available to military only Sensitive to atmospheric conditions Gross level detector - does not provide range information Requires line of sight Initial Cost: $$$$$ Maintenance: $$ Training: extensive	
CS - Chemical Support 01 - Portable			
07CS-01-KAVC Kit, Air/Vapor Chemical Sampling	Air/vapor chemical sampling/evidence kit.	Commercial sample collection kits --- Initial cost: $ Maintenance: $ Training: minimal	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
CS - Chemical Support 01 - Portable - *Continued*			
07CS-01-KLCS Kit, Liquid Chemical Sampling	Liquid chemical sampling/ evidence kit.	Commercial Sample Collection Kits ---------- Initial cost: $ Maintenance: $ Training: minimal	
07CS-01-KSCS Kit, Solid Chemical Sampling	Solid chemical sampling/ evidence kit.	Commercial Sample Collection Kits ---------- Initial cost: $ Maintenance: $ Training: minimal	
07CS-01-KVES Kit, Chemical Sampling/Evidence, Containment Vessels	Chemical sampling/evidence kit, containment vessels.	Commercial Sample Collection Kits ---------- Initial cost: $ Maintenance: $ Training: minimal	
07CS-01-LEAK Detectors, Leak	Leak detectors (e.g., soap solution, ammonium hydroxide, ultrasonic, etc.)	---------- Initial cost: $ Maintenance: $ Training: minimal	
ED - Explosive Detection 01 - Portable			
07ED-01-DOGS Canines, Explosive Detecting	Explosive detecting canines, related CBRNE training, protective equipment/garments, handling	---------- Departments should consider and plan for food, kenneling, transportation, and veterinary expenses associated with explosive detecting canines. →	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
ED - Explosive Detection 01 - Portable - *Continued*			
	and training accessories. [D]	Initial Cost: $$ Maintenance: $$ Training: Extensive	
07ED-01-SNIF Air-Sampler, Explosive Detecting, Handheld	Handheld air-sampling explosive detectors [D,I]	Detects particulates and vapors Some contain radioactive sources --- Wipe test required for equipment with radioactive source False Positives and Negatives Initial cost: $$ Maintenance: $$ Training: moderate	
ED - Explosive Detection 03 - Fixed-Site Sampling and/or Detection Systems			
07ED-03-PORT Portal, Explosive Detecting	Ion Mobility Spectrometry (IMS) explosives screening equipment. Two types: Walk-through, and Drive-through (Vehicle) [D,I]	Walk-through / Vehicle Drive-through portal monitor --- Requires frequent calibration and confidence testing Subject needs to remain in monitor for several seconds False positives possible Initial Cost: $$$$ Maintenance: $$ Training: Extensive	
07ED-03-SWPE Swipe Test, Explosive Detecting	A cloth item used to wipe the surface and place in a machine that analyzes vapor for identifying the	Fixed facility screening device --- Requires presence of particulate matter Requires regular calibration by trained technician →	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
ED - Explosive Detection 03 - Fixed-Site Sampling and/or Detection Systems - *Continued*			
	explosive. [D,I]	Swipes may be proprietary to machine Initial Cost: $$$ Maintenance: $$$ Training: Moderate	
ED - Explosive Detection 04 - Standoff Detectors			
07ED-04-XRAY X-Ray, Explosive Detecting	X-Ray systems for explosive detection. [D,I]		
RD - Radiological Detection 01 - Portable			
07RD-01-DHPG Detector, High-Purity Germanium	High-purity germanium detector. [D,I,Q]	Portable handheld or laboratory fixed Gamma Isotope Characterization --- Considerable preparation time Liquid Nitrogen coolant required Limited battery life for portable units Calibration standards required Initial cost: $$$ Maintenance: $$ Training: extensive	68
07RD-01-DOSE Dosimeters, Electronic	Electronic dosimeters. (ED) [D,Q]	Auto range (mR to R)/hour (SI Units also available) Small, lightweight Beta/Gamma detection Audible alarm →	69

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
RD - Radiological Detection 01 - Portable - *Continued*			
		---------- Limited battery life Vibralert option Limited sensitivity Initial cost: $ Maintenance: $ Training: Minimal	
07RD-01-DOSP Dosimeters, Personal	Personal dosimeters, film or Thermoluminescence Dosimetry (TLD) [D,Q]	Film type detects Gamma, X-Ray, and Neutron TLD also detects Beta Records total dose to wearer ---------- Not self-reading Temperature sensitive Service costs Initial cost: $ Maintenance: $ Training: minimal	70, 138
07RD-01-DOSS Dosimeters, Self-Reading	Self-Reading Dosimeters (SRD) or Pocket Ionization Chambers (PIC). [D,Q]	Records total dose to wearer Detects Gamma only ---------- Shock sensitive Charging unit [battery operated & non-battery (piezoelectric)] Difficult to read Initial cost: $ Maintenance: $ Training: minimal	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
RD - Radiological Detection 01 - Portable - *Continued*			
07RD-01-HHCM Meters, Contamination, Handheld	Handheld contamination meters (alpha/beta, beta/gamma). [D,I,Q]	Multiple probes, mission dependent Various scales (CPM, mR, Sv) --- Limited battery life Calibration required Alpha Mylar face prone to damage Initial cost: $ Maintenance: $ Training: moderate	70
07RD-01-PDGA Detector, Personal Radiation (Gamma & Neutron)	Personal radiation "detector" (gamma & neutron). [D]	Portable High sensitivity Response time: quick Detects Gamma and/or Neutron --- Operator must set alarming levels. No self confidence test built in. Initial cost: $ to $$ Maintenance: $ Training: moderate	69
RD - Radiological Detection 02 - Transportable Lab Equipment			
07RD-02-HHSP Spectrometer, Handheld (NaI or CZT) with Nuclide Identification	Handheld spectrometer, (NaI or CZT) with nuclide identification. [I,Q]	Fixed or portable Spectral Analysis Neutron detection capable --- Calibration required Library of Isotopes or Reachback required to ID Limited battery life →	71

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
RD - Radiological Detection 02 - Transportable Lab Equipment - *Continued*			
		Temperature sensitive Initial cost: $$ Maintenance: $ Training: extensive	
RD - Radiological Detection 03 - Fixed-Site Sampling and/or Detection Systems			
07RD-03-PMVP Monitors, Portal	Portal monitors [vehicles, packages (large and small) and pedestrians]. [D]	Fixed or portable Beta, Gamma and Neutron detectors; varied configuration by manufacturer --- Require radiation source to verify operation Calibration requires service contract Sensitivity requirements Initial cost: $$$ Maintenance: $$ Training: extensive	72
RS - Radiological Support 01 - Portable			
07RS-01-AFCB Equipment, Air Sampling	Air flow calibrators for samplers. Personal air sampler. Area air sampler (high volume).	Particulate collector Fixed or portable --- Outside analysis of filter medium: costly Initial cost: $ to $$ Maintenance: $ Training: moderate	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
SE - Support Equipment 01 - Portable			
07SE-01-IHTS Sensor, Heat, Infrared	Heat sensing device.	Handheld or hands free High temperature sensitivity High quality resolution --- Waterproof Durable Limited battery life Initial cost: $$ Maintenance: $ Training: minimal	
07SE-01-THMS Thermometer, Surface	Surface thermometer.	Handheld Accurate Precise Durable --- Initial cost: $ Maintenance: $ Training: minimal	
SE - Support Equipment 03 - Fixed-Site Sampling			
07SE-03-ENVS Equipment, Environmental (Weather) Surveillance	Environmental (weather) surveillance equipment to support CBRNE detectors.	Wind speed/direction Temperature Humidity Barometric pressure --- Fixed (vehicle mounted) or portable Information transfer →	

[1] *Use numbers given to refer to Standards List at the end of this document.*

Item Number/Title	Description	Features/Operating Considerations	Standards[1]
SE - Support Equipment 03 - Fixed-Site Sampling - *Continued*			
		Software interface Initial cost: $$ Maintenance: $ Training: minimal	

[1] *Use numbers given to refer to Standards List at the end of this document.*